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DEVICE FOR REMOVING PRINTED PRODUCTS FROM A SADDLE CONVEYOR  
[VORRICHTUNG ZUR ENTNAHME VON RITTLINGS TRANSPORTIERTEN  
DRUCKPRODUCTEN]

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The invention concerns a device for removing printed products transported astride a saddle-shaped support of a conveyor on rotating carriers at regular intervals.

A device of this kind is described, for example, in CH A 358,100 and can, among other things, be used in a gatherer-stitcher, in which several feeders, which in each case feed the printed sheets associated with them in a specific sequence over one another astride the saddle-shaped support, are arranged along a conveyor, in order then to be further transported by the conveyor to the stitching station.

The delivery end of the conveyor is made by means of a lifting or removing device that includes a lifting tongue that is mounted capable of rising and lowering over, respectively under, the support of the conveyor. This raising device is coupled with the driving motion of the conveyor by means of an operating system, so that the lifting tongue can be raised over the support periodically with a vertical motion component and a motion component oriented in the direction of advance through a slit in the support, in such a way that the printed sheets lying on the lifting tongue in this case are pushed between roller pairs arranged one after the other, the rotation axes of the rollers being oriented parallel to the plane of motion and in each case perpendicular to motion components transverse thereto. In addition, one roller of a roller pair is driven and the other is

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\*Numbers in the margin indicate pagination in the foreign text.

mounted freely turning as well as elastically pressed against the first one.

This operation of the known design has been improved with respect to the right-angle deflection of the printed products; however it furthermore proves to be unreliable in the case of greater speeds, respectively higher throughput.

Therefore the object of the present invention is to create a device of the above-mentioned kind that operates as much as possible without mistakes in the case of higher demands on the reliability and performance.

According to the invention this object is achieved by having the conveyor mounted approximately tangentially under the circular path of at least one clamping device gripping the printed products on the fold, revolving in the proximity of the conveyor in the same direction and with at least approximately the conveying speed of the printed products, so that a gradual deflection of the printed products can arise.

The device according to the invention could, of course, be used for removing printed products from an inserting machine, without a fundamental change being made.

Preferably, the circular path has a rotation axis around which the clamping device rotates. Of course, a rotating pulling element on which the clamping device is controllably mounted could fulfill the same purpose.

Advantageously, there is a clamping device, provided with at least one set of clamping tongs, which device consists of a carrier driven around the drive shaft, a helping piece on the carrier mounted capable of rotating around a rotation axis parallel to the drive shaft with a radial separation from the drive shaft, to which helping piece the clamping tongue is fastened, and a mechanism driving the holding piece, with respect to its rotation axis, by a rotation angle directed opposite to, and of the same amount as, the rotation angle of the carrier, by means of which a very careful removal of the printed product from the support of the conveyor.

In this case it proves to be favorable if the clamping action of the clamping tongs is directed parallel to the rotation axis, so that the printed products can be gently gripped therewith.

A mechanism in the case of which the holding piece is connected with a gear that is drive-connected via an intermediate gear serving for angle reversal with a gear ring permanently mounted coaxial to the drive axis, so that a regular removal process can appear, proves to be an advantageous design.

A disk on which the clamping tongs can be fastened or a radial arrangement of carriers distributed around the drive shaft is recommended for the carrier.

Instead of a gear drive, a wheel fixed coaxial to the drive shaft and a pulley of an endlessly circling drive belt, preferably a toothed belt, mounted capable of turning on the carrier, also have proved to be worthwhile.

Advantageously, a lifting device lifting the printed products from the support at the receiving point is associated with the clamping device on the conveyor, which lifting device is made with a recess so that the printed products can be gripped by the clamping tongs on the fold.

After an approximately 90° deflection of the conveying direction by the circulating clamping device, the invention provides for a conveyor that is located in the travel path of the deflected printing products and trouble-free further transport is ensured.

The clamping tongs can have two movable tong parts, that in each case are mounted on shafts of two engaging tooth segments and can be operated pressed against one another, respectively the clamping tongs can be closed against the force of a spring by a roller engaging on a tooth segment controllably supported on the carrier, spring.

The holding piece connected with the gear of the mechanism, which has a control roller drive-connected with a tooth segment for /2 controlling the clamping tongs, engaging in a control path on the carrier, is suitable for this.

It is advantageous to provide a deflecting element, for example a roller running on a guide, forcing the clamping tongs out of an approximately vertical movement plane, following an adjustable guide, on a tongs part consisting of an elastic material, in order to adjust the clamping tongs to the position of the travel path of the printed products that changes because of the thickness differences.

The invention is explained below by means of a specific embodiment with reference to the drawing, which is to be consulted with respect to all features not explained in greater detail in the description. In the drawing:

Fig. 1 shows a schematic side view of the device according to the invention on a conveyor,

Fig. 2 shows a view of the device according to arrow II in Fig. 1,

Fig. 3 shows an enlarged section of the device in the transferring area and

Fig. 4 shows a side view according to arrow IV in Fig. 3.

Figs. 1 and 2 show a device 1 for removing printed products 4 transported astride a saddle-shaped support 2 of a conveyor 3. These products follow at regular distances on carriers 5 that are attached to an endlessly rotating pulling element, in the direction of arrow F. It was possible to associate the conveyor 3 with a gatherer-stitcher and to connect the above-mentioned device 1 downstream for removing a stitching station.

Above the conveyor 3 there is a clamping device 7 rotating around a drive shaft 6 in the direction of the arrow R, which conveyor rotates in the same direction in the approaching area to the conveyor 3 mounted approximately tangentially below the circular path of clamping tongs 8 of the clamping device 7, and with approximately the same speed as the printed products 4 on the conveyor 3.

In anticipation, it is to be noted that the rotating speed of the clamping tongs 8 can be slightly higher than the delivery speed of the printed products 4 on the conveyor 3, so that by the increasingly delaying parallel speed components of the clamping tongs 8 after traversing the deepest point on the circular path where the printed products 4 are gripped by the clamping tongs 8 on the fold 9, compression of the printed products by the carrier 5 can be avoided.

The clamping device 7 according to Fig. 1 consists of three clamping tongs 8, that are connected by means of a holding piece 10 with a three-armed, respectively star-shaped carrier 11 that also can be made as a disk. The holding piece 10 is mounted capable of rotating around a rotation axis 12 parallel to the drive shaft 6 at a radial distance from the drive shaft 6 of the carrier 11. The clamping tongs 8 in each case are mounted on the holding piece 10.

Furthermore, the clamping device 7 has a mechanism 13, by which the holding pieces 10 are driven with respect to their rotation axis 12 by a rotation angle directed opposite to, and of the same amount as, the rotation angle of the carrier 11, in such a way that the clamping tongs 8 do not change the orientation of a printed product 4 gripped on the conveyor 3 on the conveying path.

The clamping action of the clamping tongs 8 is oriented parallel to the rotation axis 12 thereof, respectively at a right angle to the direction of travel of the printed products 4.

The mechanism 13 for its part has a gear 14, connected with the holding piece 10, that engages with an intermediate gear 15 intended



for angle reversal, which again is drive-connected with ring gear 16 mounted coaxial to the drive axis 6.

In the case of a mechanism 13 not illustrated, that is made as a traction mechanism, a fixed wheel is provided instead of the ring gear 16 and a pulley for an endlessly revolving drive belt, preferably toothed belt, that in each case holds the clamping tongs 8 in a stable position by the rotary motion of the carrier 11, is provided for the gear 14 connected with the holding piece 10.

A lifting device 17 lifting the printed products 4 from the support 2 of the conveyor 3 is mounted at the point of receiving the printed products 4 by the clamping device 7. The lifting device moves under the fold 9 of a printed product 4 with a perpendicular and horizontal motion component, so that the printed products 4 on the one hand is lifted from the support 2 and at the same time are offset in a parallel conveying motion present on the conveying device 3.

In order to be able to lift the printed products 4 from the support 2 without problems, the element lifting the printed products 4 is provided with a recess 18 under the fold 9, so that the bar-like elements 19 of the tongs parts 20, 21 act exclusively on the printed products 4.

The lifting device 17 accompanying the printed products 4 on the conveyor 3 serves for careful transfer of the printed products 4 from the conveyor 3 to the rotating clamping device 7.

A feeder 22 is connected to the feeder section set back by the clamping device 7 by around 90°. This feeder consists of a turning

drum 24 partially surrounded by one or more guide belts 23, rotating around an approximately horizontal axis, which drum forms a conveying gap 26 opening in the travel path of the printed products transported by the clamping device 7 printed products with one or more endlessly rotating conveyor belts 25. /3

Figs. 3 and 4 show the design of a clamping tongs 8 of the clamping device 7 in the transfer area of the conveyor 22. The perpendicular dash-dot line 27 marks the travel path of the printed products 4 transported by the clamping device 7. On the carrier 11 the holding piece 10 turning around the rotation axis 12 is drive-connected with the gear 14. In this case a console 28 under the holding piece 10 permanently connected with the carrier 11 swivels by the same angle as the carrier 11. Furthermore, the holding piece 10 serves for mounting two mutually engaged toothed segments 29, 30 with which the tongs parts 20, 21 are connected via shafts 31, 32. A tension spring 33 acting on the turning motion of the shafts 31, 32, respectively the tooth segments 29, 30 connected with the latter for opening the clamping tongs 8 is anchored at holding points 34 projecting from the shafts 31, 32.

The closing motion of the clamping tongs 8 is initiated by a roller 35 that follows a control path, engaging on the tooth segment 30, supported with control on the console 28. The tongs parts 20, 21 are made of an elastic material, for example spring steel, so that they, on the one hand can be pushed into the closing position of the clamping tongs 8 for achieving a higher clamping pressure, and on the

other hand the elastic material permits the clamping tongs 8 to easily change the travel path of the printed products 4 in the case of thicker printing products 4 by means of a guide roller 36 fastened to the tongs part 20, that runs on an adjustable guide, so that the printed products do not appear at the feeder slit 26 that is invariable with respect to position.

## Patent Claims

1. A device for removing printed products transported astride a saddle-shaped support or in a feed channel of a conveyor on rotating carriers at regular intervals, wherein the conveyor (3) is mounted approximately tangentially under the circular path of a clamping device (7) controllably gripping the printed products (4) on the fold (9) or the open side, revolving in the proximity of the conveyor (3) in the same direction and with at least approximately the conveying speed of the transported printed products (4).

2. The device according to Claim 1, wherein the circular path arranged in an approximately perpendicular plane has a drive shaft (6) of the clamping device (7) at a right angle to the circular path.

3. The device according to Claim 1 or 2, with a clamping device (7) having at least one clamping tongs (8), characterized by a carrier (11) driven turning around the drive shaft (6), a holding piece (10), mounted on the carrier, capable of turning around a rotation axis (12) parallel to the drive shaft (6) at a radial separation from the drive shaft (6) of the carrier (11), on which holding piece the clamping tongs (8) is mounted, and a mechanism (13) driving the holding piece (10), with respect to the rotation axis (12), by a rotation angle of the carrier (11) directed opposite to, and of the same amount as, the rotation angle of the carrier (11), and by the turning motion of the carrier (11).

4. The device according to Claim 3, wherein the clamping action of a clamping tongs (8) is directed parallel to the rotation axis (12).

5. The device according to Claim 3, wherein the mechanism (13) has a gear (14) connected with the holding piece (10), that is drive-connected via an intermediate gear (15) serving for angle reversal with a gear ring (16) permanently mounted coaxial to the drive shaft (6).

6. The device according to Claim 5, wherein the carrier (11) is made as a disk or in a radial, respectively star-shaped configuration.

7. The device according to Claim 3, wherein the mechanism (13) has one pulley of an endlessly rotating drive belt fixed coaxial to the drive shaft (6), and one pulley connected with the holding piece (10), mounted capable of rotating on the carrier (11).

8. The device according to one of Claims 1 to 7, wherein a lifting device (17) lifting the printing products (4) at the transfer point from the support (2) of the conveyor (3) is associated with the clamping device (7). [Translator's note: line 44 in the original is a combination of lines 43 and 45 and should be ignored]

9. The device according to one of Claims 1 to 7, wherein the feeder end of the clamping device (7) laterally offset from the conveyor (3) is connected with this communicating conveyor (22).

10. The device according to one of Claims 1 to 9, wherein the tongs parts (20, 21) of the clamping tongs (8) in each case are fastened to a shaft (31, 32) of two engaging tooth segments (29, 30)

connected with the holding piece (10) and by means of a roller (35) supported with control on the carrier (11) engaging on a tooth segment (29, 30) can be pressed on one another against the force of a spring /5 (33).

11. The device according to Claim 10, wherein one of the tongs parts (20, 21) made of an elastic material is made with a guide roller (36) forcing the clamping tongs (8) out of an approximately vertical movement plane, following an adjustable guide.

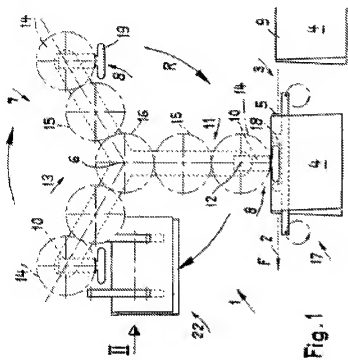


Fig. 1

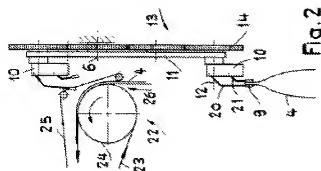


Fig. 2

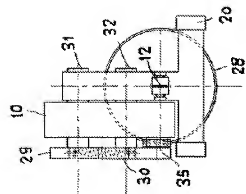


Fig. 4

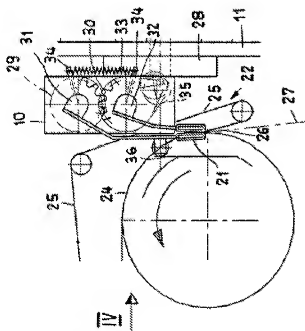


Fig. 3